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Education  
Choice & Innovation  
Committee

Tuesday, October 18, 2005

Meeting Packet



# **The Florida House of Representatives**

**Education Council**

**Choice & Innovation Committee**

**Allan G. Bense**  
**Speaker**

**John K. Stargel**  
**Chair**

## **MEETING AGENDA**

**October 18, 2005**

**212 Knott, 12:45-2:00 PM**

**I. Call to Order**

**II. Chairman's Remarks**

**III. Consideration of the following:**

**Presentation by Mike Eason, Executive Director of Florida  
Education Technology Corporation**

**Presentation by Dr. Cathy Wooley-Brown, Vice President of White  
Hat Management and Micki Tubbs, CIO of White Hat  
Management**

**Presentation by fifth grade teacher, Lynn Clark and six students  
from her 5<sup>th</sup> grade class: Billy Harris, Devon Young, Chase  
Golden, Chelsea Cash, Becca Prickett, Hannah Pruett, and Cody  
Walker**

**IV. Closing Comments**

**V. Adjournment**



# New Technologies and Their Impact on the Classroom

Education Choice and Innovation  
Committee  
Florida House Of Representatives

Mike Eason  
Executive Director  
Florida Educational Technology Corporation  
850.219.9600  
easonm@fetc.org

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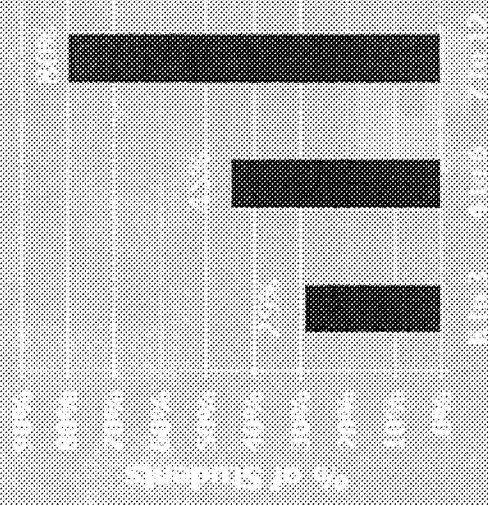
**FETC**  
Florida Educational Technology Corporation

# Kids are Ultra Communicators

## Ultra Communicators

- #1 online activity in grades 6-12 is email.
- Among students in grades 7-12:
  - 70% have at least one screen name
  - 54% know more IM screen names than home phone numbers.

### Students with Email



Source: National Center for Education Statistics, 2002  
Survey of Student Technology National Report on Trends in the Use of Technology by Students (2002)

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# Students' Priorities

## Top Priority at School

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If students were in charge of designing a new school their number one tech demand would be . . .

Fast, wireless access

- ubiquitous Internet connectivity
- to facilitate anywhere, anytime learning



Source: Anderson, Dwyer, and Vroman, "The Impact of Technology on Students' Learning: A Report for CoSN" (2004)

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# New Technologies for Kids

- Cell Phones
- iPod/MP3 Player
- Calculator
- Flash Drive
- Handheld or Tablet
- Digital Camera
- Playstation

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# Cell Phone

THE DIGITAL BACKPACK – KAREN GREENWOOD HENKE

- **Common Use:**
  - Call & text-message friends
- **Learning Use:**
  - Jot down reminders, due dates, and notes with alarms
  - Share ideas and drafts
  - Poll groups of students (locally and geographically dispersed)
  - Access assignments in visual, text, or audio formats
  - Practice speeches using the stopwatch
  - Photograph research documents that can't leave the library

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# iPOD/MP3 PLAYER

THE DIGITAL BACKPACK – KAREN GREENWOOD HENKE

- **Common Use:**
  - Dance to your favorite song anywhere
- **Learning Use:**
  - Record and play back teacher instructions
  - Download a foreign-language radio broadcast or NASA science lesson
  - Listen while reading to improve comprehension
  - Help focus in a noisy room
  - Compare recordings of a musical selection
  - Store portfolio

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# CALCULATOR

THE DIGITAL BACKPACK – KAREN GREENWOOD HENKE

- **Common Use:**
  - Calculate math problems
- **Learning Use:**
  - Collect data for a science experiment using probes
  - Practice test prep for exams
  - Take notes and access Internet content

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# FLASH DRIVE

THE DIGITAL BACKPACK – KAREN GREENWOOD HENKE

- **Common Use:**
  - Transfer data
- **Learning Use:**
  - Keep notes, documents, and files—even entire textbooks—with you for use at Mom’s house, Dad’s house, the library, or school

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# HANDHELD or TABLET

THE DIGITAL BACKPACK – KAREN GREENWOOD HENKE

- **Common Use:**
  - Keep track of dates and IM names
- **Learning Use:**
  - Read, listen to, and mark up eBooks
  - Track vocabulary words
  - Beam project contributions to student team leader
  - Record running times, diet, and sleep for phys-ed project
  - IM to collaborate on projects
  - Browse school web site to manage personal learning plan
  - Present results to class and remote participants

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# DIGITAL CAMERA

THE DIGITAL BACKPACK – KAREN GREENWOOD HENKE

- **Common Use:**
  - Take pictures of your friends
- **Learning Use:**
  - Visual recording of a field trip
  - Record events for yearbook and school web site
  - Video-capture experiments for analysis and presentation
  - Create digital portfolio of art work

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# PLAYSTATION

THE DIGITAL BACKPACK – KAREN GREENWOOD HENKE

- **Common Use:**
  - Improve your game stats
- **Learning Use:**
  - View, share video recording for observational science projects
  - Play instructional video game to learn mathematical formulas
  - Show digital portfolio
  - Driver's-ed simulations with safety tips and evaluation

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# Educational Technology Trends

- Distance Learning
- Wireless
- Smaller
- Administrative Functions
- Increased Bandwidth usage
- Accountability

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# National Market

- Why Look at the National Market
  - Companies do not develop specially for Florida
  - Companies have gotten larger and are more global as a result
  - NCLB has created a more National Climate for development

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# National Spending/Buying Trends

- Industry Consolidation
- Shift from Instructional to Administrative focus
- Shift from school making purchase decisions to district making purchase decisions

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# K-12 Technology Budgets

- 2003-2004 total technology expenditures with erate – \$7.87 B (Quality Education Data)
- \$103 per pupil spent annually for Ed Tech
- 69% hardware
- 16% software/content
- 9% outside services
- 6% professional development
- (Market Data Retrieval – 2004)

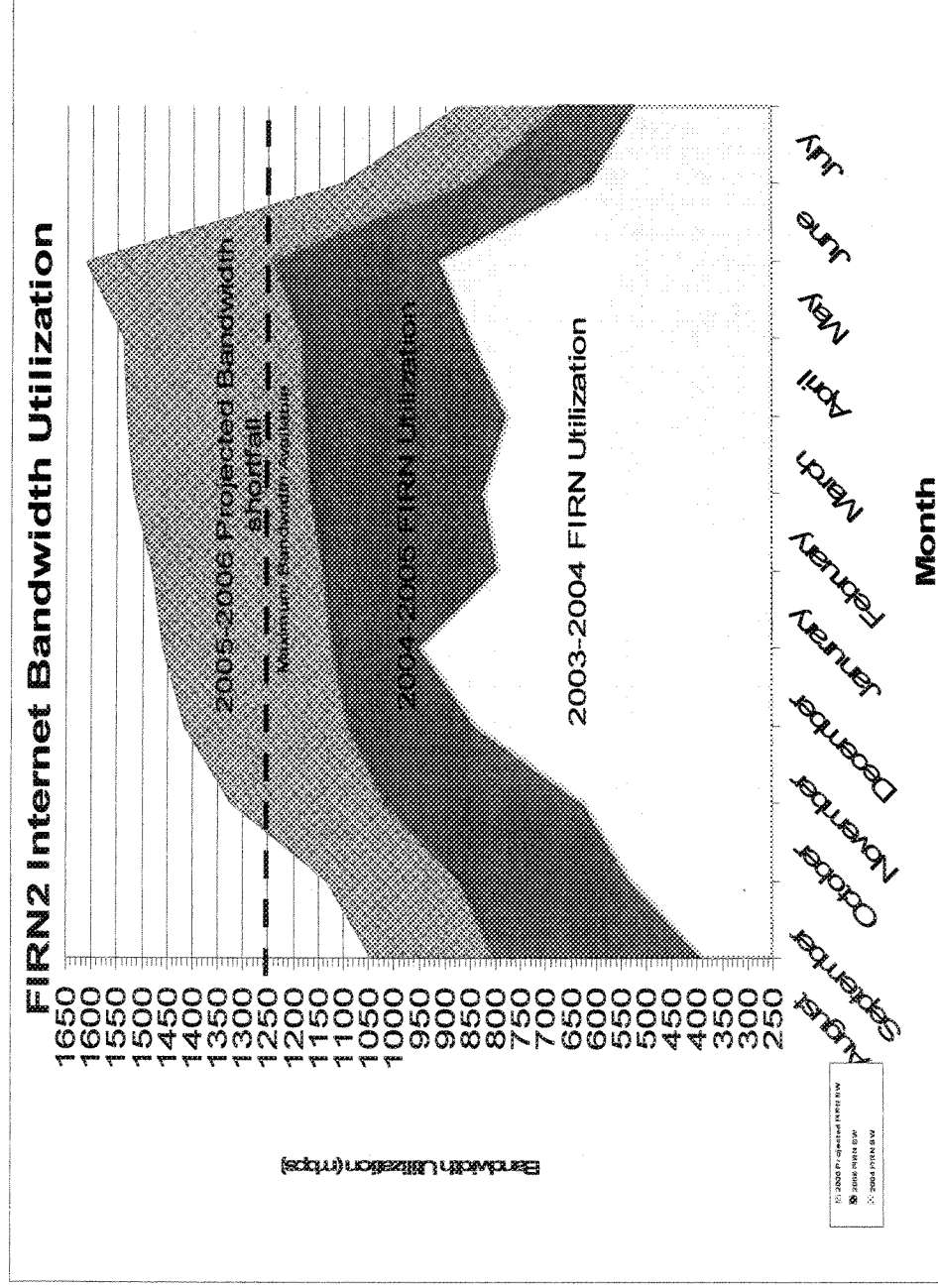
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# K-12 Technology Budgets Con't

- Funding Sources for Technology (Nat'l)
  - 50.2% District
  - 22% State
  - 8.5% eRate
  - 7.9% Other Federal
  - 7.7% Other
  - 3.7% NCLB

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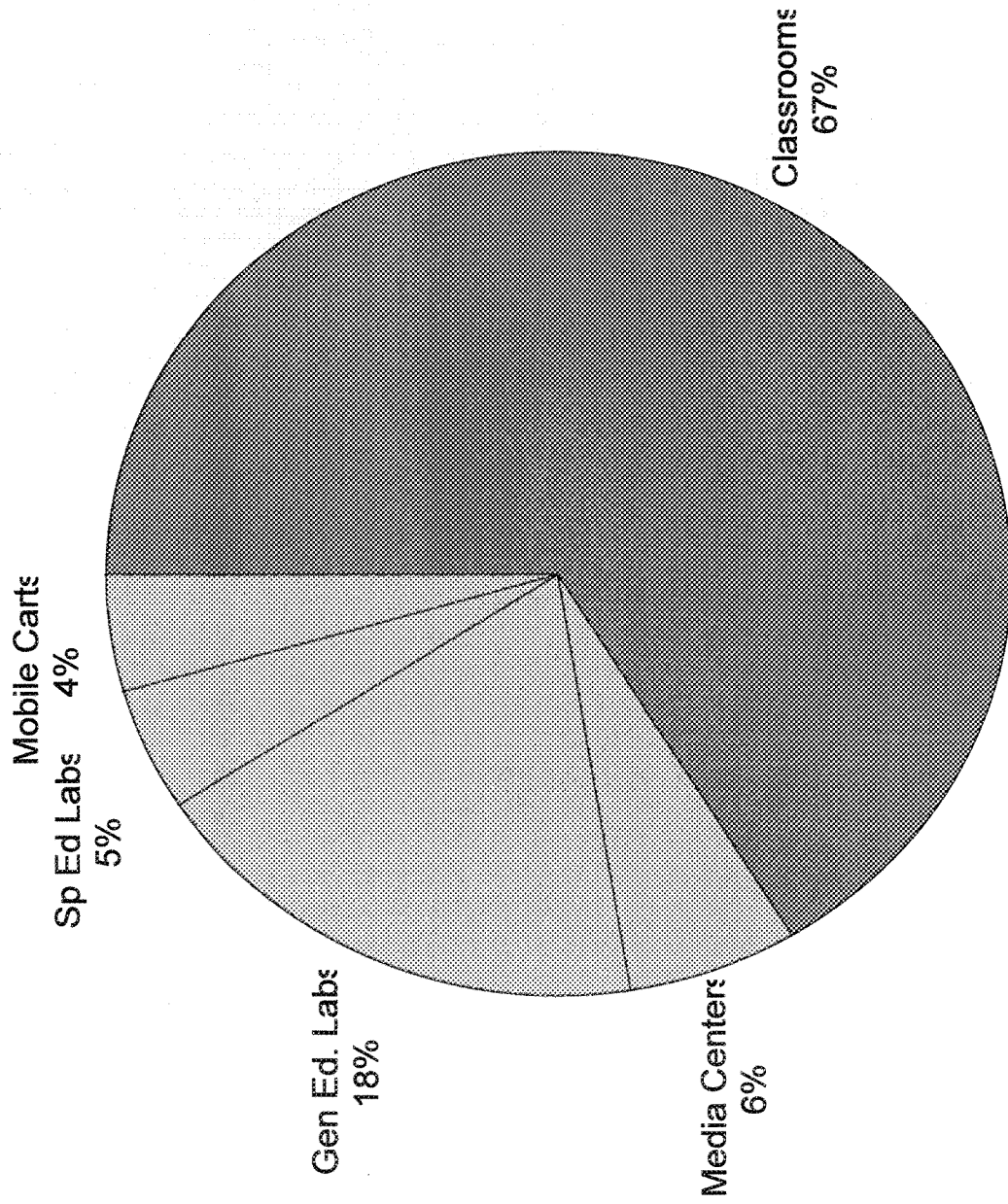
# Bandwidth Utilization in Florida



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# Student Access to Modern Computers

Florida Elementary Schools FLA - DOE

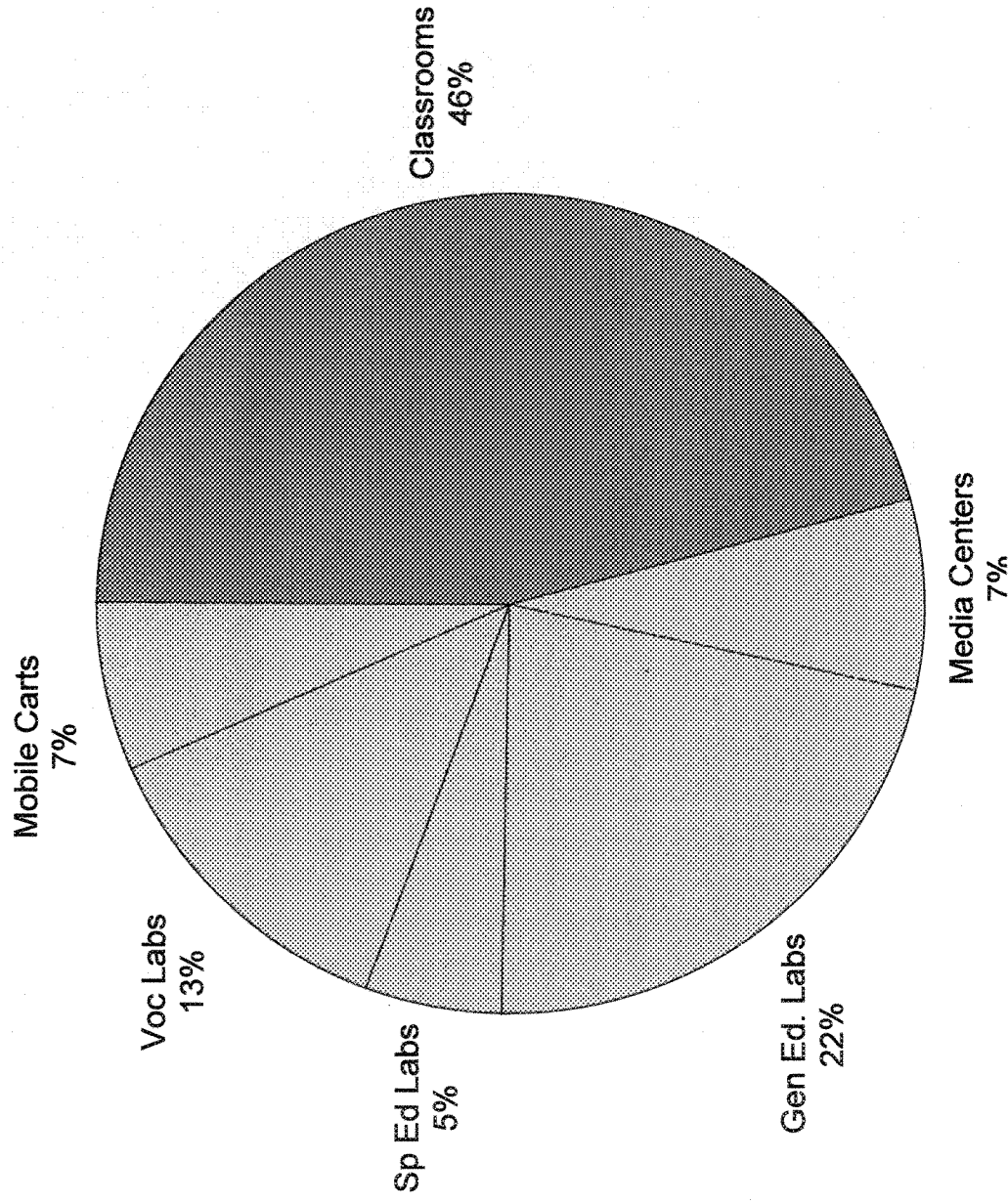


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# Student Access to Modern Computers

## Florida Middle Schools

FLA DOE

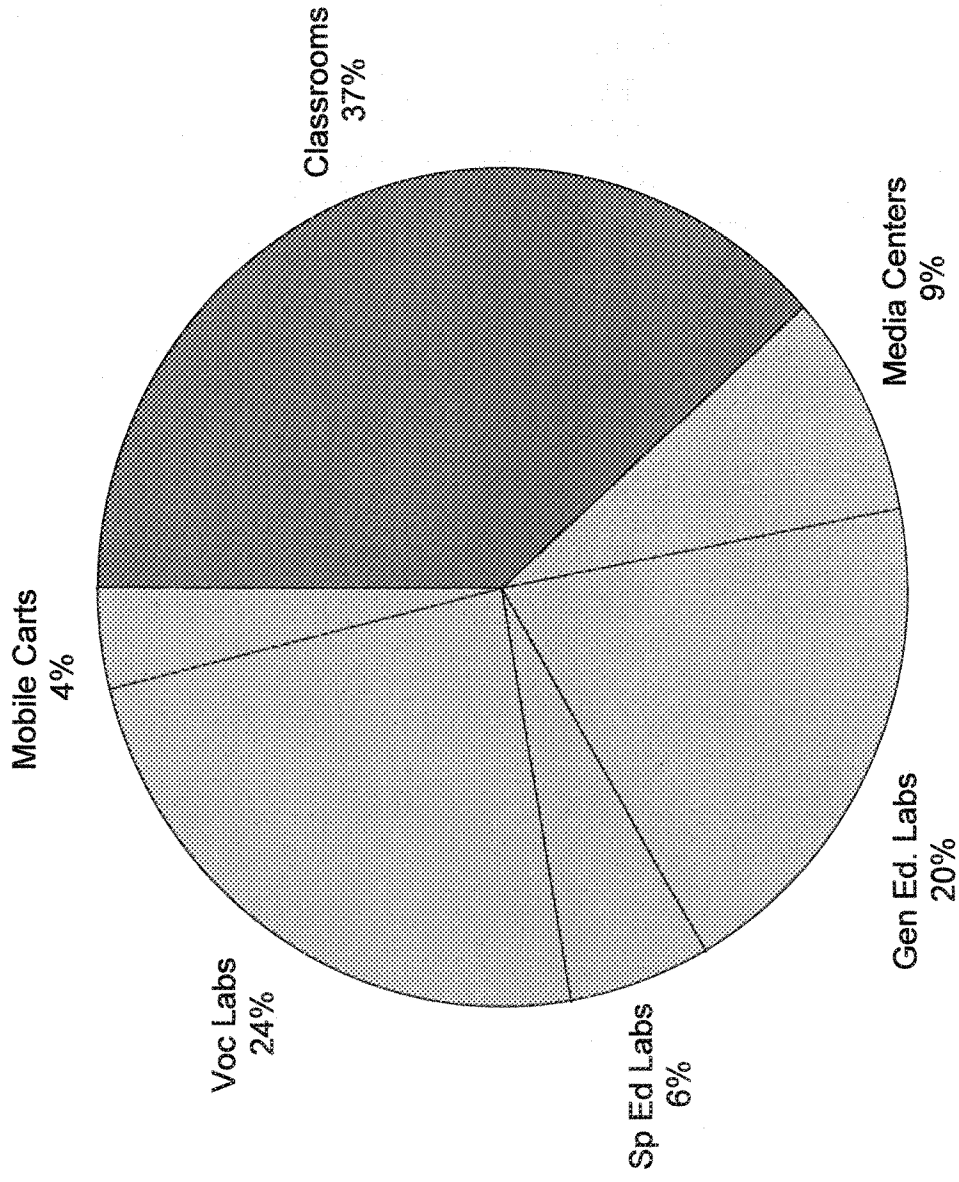


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# Student Access to Modern Computers

## Florida High Schools

FLA DOE



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# Transition....

## Textbook to Technology

- Pearson Education
- McGraw Hill
- Harcourt
- Houghton Mifflin
- Other barriers
  - Policy ..adoption cycles, language excluding electronic medium
  - Perceptions of learning

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# Vision and Leadership

- Florida Virtual School
  - 33,000 students + waitlist
  - National model
- Sunshine Connections
  - Florida controlling development process with private industry partners
- Accountability

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# Priority Issues

- Professional Development
- Infrastructure
  - Bandwidth
  - Hardware
- Curriculum Support

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# TRANSFORMING TEXTBOOKS: A THRESHOLD FORUM

Does the future of education demand rethinking textbooks? Can digital curriculum improve teaching and learning? How can we overcome the pressures of keeping textbooks the same? A panel at the crossroads of these changes explores the issues.

## ARE TEXTBOOKS BECOMING DINOSAURS?

• • • **Porto:** In our district, textbooks aren't just going to *become* dinosaurs, they already are. As soon as we adopted the one-to-one initiative, our kids and our teachers started hounding us: "Why do we still have to carry these textbooks around?" In their backpacks are all the textbooks and their laptop. It's ironic. Our only problem is, it seems like the publishing companies have not kept up with the technology initiative. While it's getting better, we're not finding

as many rich electronic resources as we would like.

• • • **Magner:** We tend to boil down this whole notion of instructional programs into the delivery mechanism, i.e., the textbook, and it seems to me that we're talking about two different things. The textbook is essentially the analog delivery mechanism for an instructional program. Are we talking about the delivery mechanism as being a dinosaur or the instructional programs that they are designed to deliver?

• • • **Driesler:** Tim, you make an excellent point. In the Association of American Publishers, not a single member owns a printing press or a paper mill. We are not wedded to a delivery mechanism. We are providers of curriculum. How it is delivered, whether by print or electronically, quite frankly, our members are agnostic on. And it surprised me a little bit, Dr. Porto, because I know my members are spending millions of dollars on developing electronic products. What they're finding is that there's not a sufficient market for them.

• • • **Porto:** I would agree with that. Districts like ours are caught in between. We are one of only three districts in Illinois that have adopted the laptop as the major mode of delivery. We recently adopted a new science curriculum, and we were able to do the entire thing without textbooks, just a rich variety of electronic materials, so it's getting better from when we started the initiative even eight months ago. But I'm worried that if the publishers don't see a market, it might not continue.

• • • **Wilcox:** Within the major publishers, the entire production process is digital. That it ends up being bound in a book is because the most equitable

## PARTICIPANTS

**Bruce Wilcox**  
CEO

Project Inkwell: A Strategic News  
Service Initiative

**Joseph M. Porto, Ed.D.**  
Superintendent of Schools  
Avoca School District 37, Wilmette, Ill.

**Stephen Driesler**  
Executive Director  
Association of American Publishers,  
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**Timothy J. Magner**  
Deputy Executive Director  
Education Technology,  
Council of Chief State School Officers

**Anita Givens**  
Director of Educational Technology  
Texas Education Agency

delivery methodology is the traditional textbook program. The adoption process has not rewarded those publishers for their investment in developing electronic learning products. So as a result, Dr. Porto, districts like yours lead the charge. You are one of few when viewed as a market landscape.

Unless something really dramatic happens in which many more districts and states move forward with broad-scale implementation of one-to-one computing, this movement of a digitally infused instructional program is going to be a long and gradual process—a 20- or 25-year horizon. One thing to do is get the technology into the hands of the students, so publishers can benefit from emergence of a new marketplace and learners, teachers, and administrators can have a more engaging experience. If the teacher has 25 students and four or five computers in the back of the classroom, you won't find the teacher dramatically shifting the way he or she delivers instruction. That is completely transformed when every child has technology.

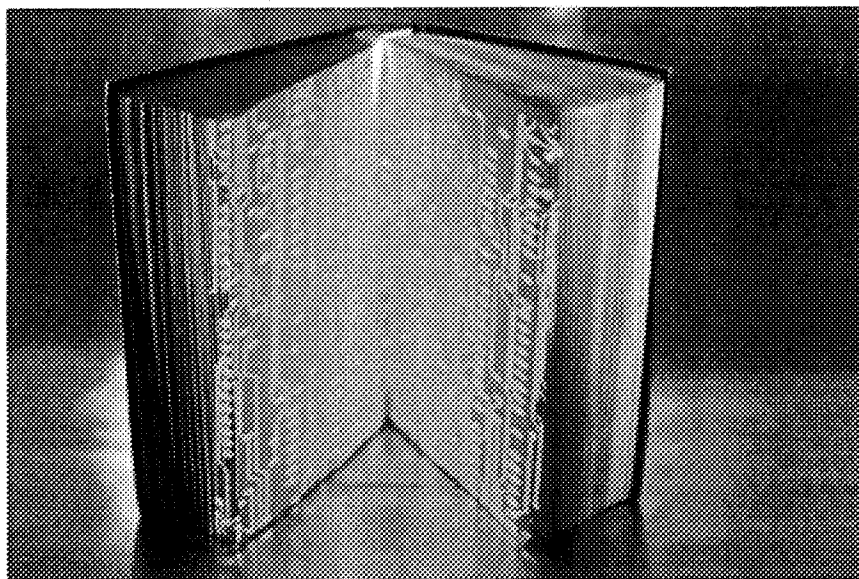
#### BEYOND TEXTBOOKS VS. TECHNOLOGY

• • • **Givens:** In Texas, we just concluded a legislative session in which quite a bit of legislation was introduced to dramatically change the textbook adoption process and the way that textbooks and content in general are funded. The majority of that legislation did not pass, but the intent was very clear: The legislature would like us to make digital content more available to our schools and to look at all the pieces of the process that might need to be changed or improved to facilitate that. But we got caught up in "textbooks versus technology." The piece that I wanted to ask is whether we are talking about taking what's traditionally delivered in a print page and converting that to an electronic medium, or are there advantages to delivering content in a way that can leverage technology?

• • • **Driesler:** Any publisher that I'm aware of is not simply taking the content in their printed textbook and putting it on the web, on a DVD, or CD-ROM. It is going to be much more interactive. There will be built-in assessments, lots of ability to drill down, link to additional materials. I think we're talking about a considerably different product than simply just the electronic version of the printed textbook.

• • • **Wilcox:** I think they're all moving toward an interactive platform that embeds the assessment and links that to the instructional process. But if you build a very

robust, dynamic curriculum that can individualize the instructional experience for every learner, how do you deliver all the different media elements in the traditional classroom that exists in Texas today? If I'm a small start-up company, and I've produced the most exceptional electronic learning products for science, such as the ones Dr. Porto's district adopted, can I scale that to deliver and promote that product across the entire state of Illinois, the neighboring states, Texas, Florida, and so on? The system currently rewards sales forces for delivery of print programs, so they talk to those who make the curriculum-based decisions. They don't go



*Punchstock*

• • •

"If you build a very robust, dynamic curriculum that can individualize the instructional experience for every learner, how do you deliver all the different media in the traditional classroom?"

• • •

across the hall and talk to the folks who are implementing technology programs.

• • • **Givens:** In Texas, there's been a dialogue among educators and publishers and everyone else involved in the process: How do we ensure that every child has the appropriate instructional materials at the grade level and in the content areas that they need? You've got to have your curriculum folks talking to your instructional technology to your information technology to your

teachers—there are so many people that need to be involved in the process.

• • • **Magner:** Do you think the state can provide either models or mechanisms or a variety of ways in which a school district can do that? Or do you think that will be driven by local school boards?

• • • **Givens:** I think it's going to be a combination of both. One of the first steps that Texas took was to combine our instructional materials and education technology operations at the [state] agency. My goal is to begin the dialogue with all of those entities, such as local school boards and school personnel. We also need to be talking to industry personnel. We need to help all the players understand the aspects that need to be addressed and figure out how to plan for what *should* be instead of only dealing with what is.

#### DOES DIGITAL CONTENT IMPROVE LEARNING?

• • • **Porto:** When we were researching whether we wanted to move in the direction of “anytime, anywhere” access, we tried to find as much research on the topic as we could. There’s lots of pseudo-research, but we did not find very highly structured and highly regarded research. We had to make the decision based on common sense and what we thought was the right thing. My board

wanted to make sure we help other districts that are thinking about doing what we’re doing, so we joined with Northwestern University at the start of our initiative to conduct a longitudinal study on the effects of this initiative. We’re mainly measuring three things during the next three years: effect of technology infusion on achievement; on attitudes of parents, teachers, and students; and on levels

“We need to figure out how to plan for what *should* be instead of only dealing with what is.”

of engaged learning in the classroom.

• • • **Givens:** We also have the Technology Immersion Pilot Project, a research project with 22 schools experiencing one-to-one computing that includes online formative assessment and professional development—

all the things that we know have to be in place to make it work. We have 22 control schools that do not have the one-to-one access and are not getting all of the other pieces of the puzzle.

• • • **Magner:** That brings up a really important point: as we look at the impact of technology broadly on education, we have not, as a community, established a new set of metrics. What are indicators of progress beyond student achievement scores, beyond standardized tests, especially given the conversation that is going on today about competitiveness and 21st-century skills? By setting up a new set of metrics or updating the metrics we have, we can create a much richer dialogue around the impact of technology and student achievement, as well as the effectiveness of technology in improving student achievement on standardized test scores.

• • • **Driesler:** I agree that there is not high-quality research as to what does improve student learning. When publishers develop a textbook, they look at what research there is. They use focus groups. They use feedback from teachers, from students. They pilot programs and get feedback.

• • • **Wilcox:** You’ll find debates within curriculum-development teams at these companies about “What is the efficacy of doing this?” They’ll inspect the research that will come of the project that Anita described in Texas. Absent that research, I think a lot of folks are really worried. Are we putting good money after bad? Have we identified the way in which this will be most effective to help students achieve their potential?

A lot of this investment in developing innovative instructional products that are delivered digitally is just competitive pressure. There’s an increased expectation that more and more components that we offer should be delivered in electronic format. Even though we don’t have the answer to “How?” and “Why?” and “Where does it work?”—the irrefutable pool of data—it is happening anyway. That’s an acknowledgment that the world our children are growing up in is going to expect some sort of digital literacy. It is a core competency.

There’s a lot of folks waiting to see the solid research—if that research is resoundingly positive, you will find a very swift shift in momentum. And that will be an interesting time for the industry.

• • • **Magner:** There’s also a longitudinal study on technology’s effectiveness, specifically looking at student achievement, that is going to be coming out from the U.S. Department of Education either late this year or early next year. That, too, will support what Bruce is

saying: once you get research of high quality, it will have that ripple effect in the marketplace.

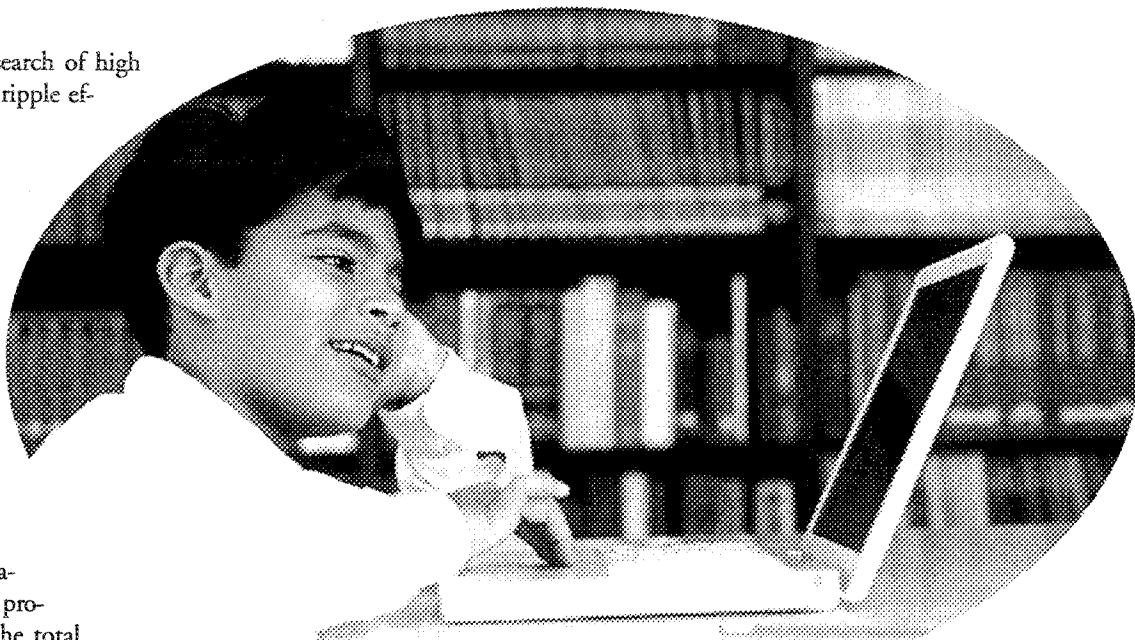
#### CLIMBING THE MOUNTAIN

• • • Driesler: It's important to talk about the cost of all this, because from a publisher's point of view, the reason the market is not there is that the school systems are telling us that they can't afford to put in the hardware, the infrastructure, the support, the professional development, the total cost of ownership that's needed to make this type of digital delivery, at least on a one-to-one basis, a reality.

• • • Porto: Certainly it's costly, but what we're doing represents only seven percent of our budget. I think it's a matter of prioritizing and reprioritizing. Districts would be surprised that, once you have the initial investment, keeping it going on a yearly basis ends up being quite compatible with the levels of expenditure you were putting into technology before the initiative. Sometimes I think it's like looking at a mountain and thinking, "How could I ever climb it?" If you really sit down with the finances, I don't think it needs to be quite the impediment it is perceived to be.

• • • Magnier: What we're seeing is probably analogous to the highway system that was developed in the '50s and '60s. I think there's a broadband infrastructure that needs to be in place to provide the flexibility when it comes to accessing digital content. Without consistent and well-distributed high-speed access, educators won't have the flexibility they need to choose the instructional programs that are important for students, whether that's digital content, interactive multimedia, or real-time collaboration with students across town or across the world. What type of learning infrastructure do we need in order to make our students competitive in the 21st century? That's a critical piece that I don't think we can ignore.

• • • Wilcox: The public perception is that we have done the job of wiring our school systems, but if you go to a sample of school districts, you'll find that the



*Stockbyte*

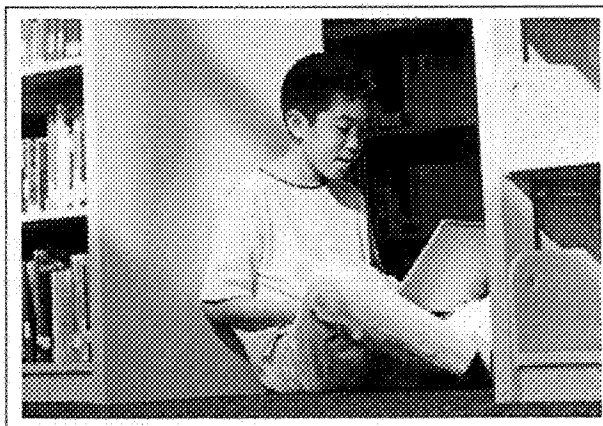
networks have been set up in patchy way within the school buildings, then in an even more disparate way to the household. Broadband delivery to the home is a fundamental piece as we go toward this digital delivery model. I can't imagine an environment where one child left school and stayed connected, whereas another child went home and was left out of that school experience. Broadband deployment in the U.S. is fundamental. It's something that needs to be addressed as a mandate at state, local, or federal level.

#### TRANSFORMING EDUCATION, NOT JUST TEXTBOOKS

• • • Wilcox: I hear a lot these days that teachers just don't click with their students anymore. Students don't think the teacher is relevant to their experience, as somebody who's going to enable them to prosper or succeed. In a one-to-one setting, there's something counterintuitive: many of our expert educators, the ones all of us say are the most reticent to use technology, are actually the ones who are first to embrace it once it's a tool that every student has. They are the ones who undergo the most significant transformation and choose to stay in their profession longer, who stay committed to educating children.

In San Diego County, there's a little school district, Lemon Grove, that moved forward with an aggressive implementation of technology, a more aggressive view on what the instructional program should be to reach

the needs of the learner. In Lemon Grove, I'll walk in and the kids are engaged in "smart pod" learning. They assemble in learning pods and focus on individual learning and also shared group activities. I always ask the question before I leave the room, "Hey kids, what do you think of your teacher?" and they all cheer. The teacher is the best person to them, somebody who's helping them be successful. That is evidence that we have done something to make schooling fun and engaging and motivating. Quantifying that in the research is a significant next step.



PictureQuest

"The world our children are growing up in is going to expect some sort of digital literacy. It's a core competency."

• • • **Magner:** I had the opportunity to go to a school, Hunters Woods Elementary, and walk around and see how the technology is integrated in everyday life in every classroom. It's not that every classroom had its own set of technology—they were moving it around. Some kids were using laptops. Some kids were using desktops. Some kids were using pen and paper. It was the integration of the digital experience into the entire fabric of the school. They were not just giving lip service to

the technology as transformative, but were actually living it every day. It was a collaboration between the principal and the staff that had, over the past three or four years, built the dynamic that allowed teachers to engage and excite their students with digital materials.

• • • **Givens:** We had a similar situation on a site visit. A teacher who was working with a group of low-achieving students came running out in the hallway and said, "Look, look what I got Jimmy to do! This is the first time he ever turned in an assignment that the rest of the class did, and he was the first

one finished!" He did it all on his laptop because he had access to the resources. She was running down the hall, telling the other teachers how excited she was. She got results from a child that she had never been able to reach before.

• • • **Porter:** Our mission statement for the one-to-one initiative was that we wanted to transform and improve the way we teach and learn. We've traditionally had a project in our middle-school student government, where the students take on roles of local government bodies and pursue a topic, and it culminates in a school board meeting. I was working with a group that was simulating a school board, and one of the issues they wanted to talk about was providing healthier choices in our lunch program. So the kids were asking me questions, and I was responding about some of the problems: that in some districts kids weren't eating the healthier lunches and it didn't become financially prudent. And as I'm talking, I see the kids, "click, click, click" on their computers. Within three minutes, one of the kids raises his hand: "There's a district in Seattle that moved to a completely salad-bar approach, and they made more money . . ." The kids were scanning, researching, and giving concrete examples. Talk about learning becoming meaningful and alive to them! • • •

## RESOURCES

**Association of American Publishers, School Division.** [www.publishers.org/school](http://www.publishers.org/school)

**Avoca School District 37.** [www.avoca.k12.il.us](http://www.avoca.k12.il.us)

**Council of Chief State School Officers (CCSSO).** [www.ccsso.org](http://www.ccsso.org)

**"One to One at School and Home." Access Learning, May 2004.** [www.ciconline.org/AboutCIC/Publications/Archives/AL\\_may04.htm](http://www.ciconline.org/AboutCIC/Publications/Archives/AL_may04.htm)

**Project Inkwell: A Strategic News Service Initiative.** [projectinkwell.com](http://projectinkwell.com)

**Texas Education Agency.** [www.tea.state.tx.us](http://www.tea.state.tx.us)





# Program Overview



*Life Skills Centers are tuition-free charter schools, serving at-risk and dropout youth ranging in age from 16 to 21. Life Skills Centers were founded in 1999 with the opening of centers in Akron, Cleveland, and Youngstown. As of October 2005:*

- There are currently 37 Life Skills Centers, 9 of which are in Florida: Miami, Fort Lauderdale, Delray Beach, West Palm Beach, Pahokee, Lakeland, and St. Petersburg. Additionally, there are 20 Centers in Ohio, one in Phoenix, Ariz., one each in Denver and Colorado Springs, Colo., and 5 in Michigan.
- All Life Skills Centers are fully accountable for and dedicated to meeting the educational standards established in community.
- All Life Skills Centers committed to meeting Adequate Yearly Progress (AYP) requirements and each school has an extensive plan in place to address every aspect of AYP and No Child Left Behind (NCLB) accountability measures.
- Life Skills Centers also are committed to meeting federal requirements for serving students with special needs, established by the Individuals with Disabilities Education Act (IDEA) and No Child Left Behind (NCLB), as well as any state and local requisites.
- Since inception, more than 6,200 students have graduated with a state-recognized high school diploma and a job. Commencement ceremonies are conducted in June and December, each year.
- Life Skills Centers served more than 11,000 at-risk and dropout youth in the 2004-2005 school year. More than 9,000 students are currently enrolled.
- Each student has an electronic 'Personal Success Plan' which is developed in collaboration with the teacher and parent. This plan is available 24/7 on the web-based Learning Management System, to the student, his parents, and the teacher so that everyone is involved in the learning process.
- Students work at their own levels and paces; students may attend any one of up to four, 4-hour sessions per day – morning, mid-day, afternoon, and in selected locations an evening program.
- Life Skills Centers offer the most successful at-risk and dropout education program in America. To date, no other such program has reported the equivalent number of graduates.
- Life Skills Centers are now on pace to average 2,000 graduates per year.
- A full-time, licensed Family Advocate is provided in every school that forms key relationships with students, family, staff and the community to reduce barriers to student's success and provide a nurturing and supportive environment. Family Advocates make hundreds of contacts with students and families in need by coordinating individual, group, and community services.
- The Life Skills Center's student demographics are reflective of the local community.
- Every teacher is issued a computer and the computer to student ratio is 1:1.
- Every fully enrolled Life Skills Center classroom features three full-time teachers and two full-time assistants.
- Life Skills Centers feature specially designed, computer-based curriculum developed to meet the needs of the community and it is fully aligned with state standards.
- Students have the same graduation requirements as in other local schools, including taking the same number of credits and passing the same required state tests. In addition, students must maintain employment for 90 consecutive days prior to graduation.
- Each Life Skills Center offers full-time employability specialists and a family advocate, providing a full complement of counseling and community-based referrals.



# **Smart Classrooms**

**Lynn Clark, 5<sup>th</sup> Grade Teacher  
H.G. Brown Elementary School  
Franklin County**

Ways I use the Smartboard in my classroom:

Notebook – Reading comprehension questions  
Math problems  
Draw diagrams  
Mapping skills  
States and Capitols

Interactive Software – Super Speller  
Super Number Cruncher

Internet - Searching and viewing in large group

Videos –  
[www.unitedstreaming.com](http://www.unitedstreaming.com)

Online Educational Games  
[www.harcourtschool.com](http://www.harcourtschool.com)  
[www.kidsastronomy.com](http://www.kidsastronomy.com)

# Interactive Whiteboards and Learning: A Review of Classroom Case Studies and Research Literature

**April 2004**

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# Summary

This summary of educational case-study findings and research was compiled by SMART Technologies Inc. to help educators weigh the benefits of using interactive whiteboards in the classroom.

This paper brings together research and case study observations from the United States, the United Kingdom and Australia. It includes findings from the longest-running interactive whiteboard educational research programs, SMARTer Kids™ Research (<http://www.smarterkids.org/research>), sponsored by the SMARTer Kids Foundation of Canada. Of the available case studies and research compiled for this literature review, eighteen out of the thirty sources conducted research on the SMART Board™ interactive whiteboard.

Interactive whiteboards affect learning in several ways. They serve to raise the level of student engagement in a classroom, motivate students and promote enthusiasm for learning. In at least one case, the addition of an interactive whiteboard positively affected student attendance. Interactive whiteboards support many different learning styles and have been successfully employed in hearing and visually impaired learning environments. Research also indicates higher levels of student retention, and notes taken on an interactive whiteboard can play a key role in the student review process. In addition to a positive impact on student learning, observations also indicate that designing lessons around interactive whiteboards can help educators streamline their preparation and be more efficient in their ICT (Information and Communication Technology) integration.

# The Interactive Whiteboard in Education: An Introduction

## What is an interactive whiteboard?

An interactive whiteboard is a touch-sensitive screen that works in conjunction with a computer and a projector. The first interactive whiteboard was manufactured by SMART Technologies Inc. in 1991.

Educators were the first people to recognize the interactive whiteboard's potential as a tool for learning, meeting and presenting, and they continue to comprise the largest user base for this technology, particularly in the United States and the United Kingdom.

## How can an interactive whiteboard be used in a learning environment?

Interactive whiteboards are an effective way to interact with digital content and multimedia in a multi-person learning environment. Learning activities with an interactive whiteboard may include the following:

- Manipulating text and images
- Taking notes in digital ink
- Saving notes for review via e-mail, the Web or print
- Viewing websites as a group
- Demonstrating or using software at the front of a room without being locked behind a computer
- Creating digital lesson activities with templates and images
- Showing and writing notes over educational video clips
- Using presentation tools built into the interactive whiteboard software to enhance learning materials
- Showcasing student presentations

# Research Observations

## Connecting to Learn: Student Engagement

Learning has typically been a social activity for the simple reason that most human beings need to reinforce their beliefs and understandings by asking questions of others. Current learning theories promote student engagement and consider it to be a key component of knowledge construction. These learning theories include the following:

- **CONSTRUCTIVISM** – relies on the learner to select and transform information, construct hypotheses to make decisions and synthesize learning through personalizing knowledge
- **ACTIVE LEARNING** – learners actively engage in the learning process through reading, writing, discussion, analysis, synthesis and evaluation, rather than passively absorbing instruction (e.g., lecture model of instruction)
- **WHOLE-CLASS TEACHING** – brings the entire class together, focuses their attention and provides structured, teacher-focused group interaction

Perhaps one of the biggest challenges of computer-integrated learning has been maintaining dynamic interaction with students while they sit in front of computer screens. Interactive whiteboards help overcome this challenge and enrich ICTs by providing a large workspace for hands-on work with multimedia resources. Having a space large enough for everyone to see opens a channel to higher student interaction in both teacher-directed and group-based exchanges – one can interact with the tool at the front of the class and everyone can feel involved because of the interactive whiteboard's size. The interactive nature of the product and its accompanying software allow for the development of classroom activities that are engaging for students.

## Observations from the United States

"Does the use of an interactive whiteboard as an instructional tool affect student engagement? The unequivocal answer, based on the results of both the surveys and questionnaires, is yes.... The results of the survey indicate that interactive whiteboards can be used in the classroom to increase student engagement during the learning process" (Beeland 2002).



"The SMART Board [interactive whiteboard] was novel and created enthusiasm for learning on the part of the students as evidenced in remarks made during the lessons presented using the SMART Board [interactive whiteboard] and during individual student interviews, such as 'I like touching the SMART Board [interactive whiteboard],' 'My finger is magic,' 'I like when the lines get different,' 'It's a lot more easy [using the SMART Board interactive whiteboard], but I don't know why,' 'We used the SMART Board [interactive whiteboard] and it went ding, ding, ding,' 'Every part of the word is special,' and 'The board is magic.' Students were engaged when they actually touched the SMART Board [interactive whiteboard] or manipulated text on it" (Solvie 2001).

"The SMART Board interactive whiteboard supports interaction and conversation in the classroom; it helps with the presentation of new cultural and linguistic elements" (Gerard 1999).

"It engaged my primary students in literacy learning.... I was able to interact with the class, demonstrating, modeling and manipulating what was on the board by touch. I was not confined to, or focused on, a computer that separated me from the class.... Visual display in the form of diagrams, webs and pictures, as well as use of colors and shapes to highlight text, prompted engagement" (Solvie 2004).

### **Observations from the United Kingdom**

"The students' initial response to use of the whiteboard during classes was enthusiastic, as the visual impact of the tutor simply touching the screen to start applications is initially quite dramatic. The immediate advantage of this arrangement compared to seating students at individual workstations has been that websites can be examined as a group activity, so that communication between members of the group continues, whether in English or in a foreign language (some students have remarked in the past that while individual computer work is useful, it can limit communication in the foreign language between group members). A further benefit is derived from the fact that several members of the group are not especially computer literate and are daunted by the prospect of seeking out and using websites on their own, particularly interactive sites which require regular responses from them. Being introduced to sites in a group situation, where the tutor can point to the screen and touch the relevant buttons without having to move away to the side to use a mouse or keyboard, is a useful tool in showing them how to achieve this step by

step. It allows members of the group to ask and hear others' questions and reactions before starting tasks individually" (Reed 2001).

"One shared image in the classroom encourages discussion.... The pace of the lesson is increased.... It encourages teachers to plan lessons which involve interactive whole-class activities. The teacher can look at the class, rather than at the computer keyboard (which would be the case if a computer and large monitor or image projected onto a wall were used).... The teacher can concentrate on pupils' responses" (Ball 2003).

"It quickens the pace of lessons and engages the whole class more. It is much more immediate" (Cunningham, Kerr, McEune, Smith and Harris 2003).

"[The teacher] would always choose the whiteboard for its flexibility and the opportunities it allows for individual and whole class assessment as the teacher works with the class" (Edwards, Hartnell and Martin 2002).

"Two thirds of the teachers felt that the whiteboard offered strategies for teachers to develop interactive teaching. One third stated that pupils from all ability groups were now more willing to take part in lessons. Observations of lessons confirmed the teachers' perceptions. All of the lessons were seen to use a high level of whole class interactive teaching" (Latham 2002).

"The use of an interactive whiteboard enables teachers to gather extensive feedback from pupils by listening to their explanations. From this, teachers are able to gain deeper understanding and progress. Pupils collaborating in pairs or teams using subject-specific ICT resources are able to challenge each other's understanding and learn from such collaborations" (Cox, Webb, Abbott, Blakeley, Beauchamp and Rhodes 2003).

### **Observations from Australia**

"The class is the focus of teaching activities involving ICTs, instead of individuals or a small group. [ICTs provide for a] more interactive, less didactic approach where the class can interact with the content and context of the lessons digitally through the ability to capture, combine and manipulate information from a variety of sources. The digital convergence of information from a variety of sources and devices is managed in real time by the teacher [when using ICTs]" (Kent 2003).

"All the children, parents and teachers interviewed [on the use of interactive whiteboards in education] believed the teaching was more fun, more engaging, more exciting and was impacting upon the enjoyment, speed and depth of learning" (Lee and Boyle 2003).

### **Get Focused: Motivation and Attendance**

Motivation is best described as a student's drive to participate in the learning process. Although students may be equally motivated to perform a task, the sources of their motivation may differ. Some students are intrinsically motivated to learn because they are driven to understand through self-reflection and participation in learning activities, benefiting self-esteem. Others require extrinsic motivation such as enticements, rewards or educator-defined goals.

Interactive whiteboards appeal to both types of students:

- Intrinsically motivated students volunteer to demonstrate knowledge on the interactive whiteboard in front of their peers as a means of showcasing individual achievement
- Extrinsically motivated students are enticed by the wow factor of the technology and can become motivated learners as a result of the enjoyment they experience from using the product

Greater classroom enjoyment and motivation – particularly on the part of extrinsically motivated learners – can in turn lead to fewer student absences. Interactive whiteboards are captivating enough to successfully compete with a student's favorite consumer technologies (e.g., game devices, cell phones and MP3 players), focusing students on task, garnering enthusiasm and providing additional motivation to attend class. More than a diverting gadget or game, interactive whiteboards successfully promote the computer skills students require for success in the twenty-first century.

### **Observations from the United States**

"Students like to work on the SMART Board interactive whiteboard! They love to use a board that can be operated simply by touch. They may even ask to be quizzed, simply for the fun of writing on the board. It brings true excitement to the classroom" (Gerard 1999).

"Answers to open-ended questions indicated that students were more involved, attentive, and motivated when lessons were offered using the board rather than using other teaching methods" (Bell 1998).

"[R]esearch shows that if students have the opportunity to view someone they like or respect perform a behavior they need acquire, then they stand a much better chance of acquiring that behavior.... [T]he SMART Board [interactive whiteboard] allowed the students to watch peer leaders prompt and perform the appropriate behaviors, which made the ownership of those behaviors much more enticing.... [R]esearch also has shown that people with short attention spans can attend to any situation as long as it is on a television or computer screen. The SMART Board [interactive whiteboard] provided these students with this type of viewing. Finally, SMART Board [interactive whiteboard] technology was new to these students. This novelty made their training more interesting" (Blanton and Helms-Breazeale 2000).

"[U]se of an interactive whiteboard can make learning more enjoyable, interesting, and students pay better attention" (Johnson 2004).

"[Interactive whiteboards] can enhance any lesson and entice students to learn. With the use of whiteboards, teachers can develop many creative ways to capture students' attention and imagination" (Reardon 2002).

"[S]tudents in the technology-enhanced sections reported more enthusiasm and interest in the course than did the students in traditional sections, and, perhaps as a result, the retention (student attendance) rate in the experimental sections was much higher than in the control sections.... [T]he retention rate – 97.1 per cent – was markedly higher in the interactive whiteboard-enhanced sections" (Tate 2002).

### **Observations from the United Kingdom**

"In particular, teachers reported the use of the interactive whiteboard for whole-class teaching to increase pupils' attention and reduce much of the usual fidgeting during 'carpet sessions'. These findings were further supported by lesson observations.... The evidence suggests that the boards made teaching more visual and learning more interactive, in turn encouraging greater participation from the pupils, improving their motivation and concentration" (Bush, Priest, Coe et al. 2004).

"They support self-esteem [and] empower children by dint of its sheer size for creating, viewing and manipulating pictures, sound and text.... [A] child can take on teacher rather than pupil role – equalises relationships.... The children are absorbed and empowered, with numerous opportunities for interactivity of different kinds.... Implicit in here are the positive emotions of success and pride in being able to operate the large screen and the status it has in the eyes of adults.... [Interactive whiteboards] engage children and focus their attention in a multi-sensory and varied way allowing them to be absorbed and emotionally involved in the learning process. This could be seen in observations and teachers articulate this in interviews" (Cooper 2003).

"The visual nature of interactive whiteboards was seen as a particularly valuable way to focus students' attention and keep them on task.... Using [the laptop] with the interactive whiteboard, the kids were amazed. It's visual which is good, especially with fidgety children, and it grabs their attention. It means there is more attention from everyone in the class and it's big so everyone can see" (Cunningham, Kerr, McEune, Smith and Harris 2003).

"Pupils have been lining up to answer questions [and are] eager to try.... I feel I am providing a more informative and interesting curriculum" (Greenwell 2002).

"In their questionnaire responses, 66 per cent of the teachers noted a significant improvement in pupils' attitude and response to mathematics lessons, while 16 per cent stated that pupil response was high prior to the introduction of the project" (Latham 2002).

"Using the software displayed on the large electronic interactive whiteboard was a very useful teaching tool. It enabled me to immediately focus all the children's attention at the outset of the lesson. Children are always enthusiastic and show heightened motivation when [an interactive whiteboard] is used in the classroom and, in my experience, it creates greater attention and enthusiasm to participate and respond" (Richardson 2002).

"The special-needs teacher noted that the most significant attribute was the attention and motivation the students had when working with the board.... The sustained motivation and persistence with the use of the board are the two key factors in aiding with learning outcomes" (Salintri, Smith and Clovis 2002).

"[Seventy-eight] per cent thought the students were very motivated by the whiteboard. In one lesson, the students were very excited and really got involved with enthusiasm, they all wanted to touch the board. Students thought it was cool.... Students could take an active part in class teaching by coming up and demonstrating to the whole class and gained confidence in their skills by doing so.... Students were very motivated by the whiteboard lessons and commented on the fact that they had been able to understand much better what to do by being shown rather than being told. Students remembered the lessons and hopefully this will provide a prompt to the learning aim of the lesson.... The interactive nature of the whiteboard caused the most excitement for both staff and students. Students were very enthusiastic and wanted to have a hands-on role" (Smith 2000).

"One teacher reported that pupils who hardly ever spoke in class were motivated to discuss work with their peers, and that he was able to learn much more about what such pupils really understand.... Interactive whiteboards [can] promote class discussions, and [improve] pupils' explanations and presentation skills" (Cox, Webb, Abbott, Blakeley, Beauchamp and Rhodes 2003).

### Observations from Australia

"When one can sit and listen to five-year-old children in kindergarten express what is distinct about whiteboard-focused learning at Richardson and how it assists them to learn more, faster and in a more enjoyable and interesting way, then one senses something rather special is happening" (Lee and Boyle 2003).

# Reaching Out: Learning Styles and Special Needs

Every day, educators strive to develop strategies and tools that will reach students with unique or diverse learning needs. Many of these learning styles – even the requirements of visual, hearing-impaired and other special-needs students – can be addressed when lesson delivery and learning activities incorporate use of an interactive whiteboard:

- **VISUAL LEARNERS** benefit from note taking, diagramming and manipulating objects or symbols. As the interactive whiteboard is easy to use, it enables students of all ages to see their own writing and objects of their own creation when they use the product.
- **KINESTHETIC OR TACTILE LEARNERS**, typically difficult to engage in traditional classroom activities that are usually more visual or auditory in nature, are able to reinforce learning through exercises involving touch, movement and space on an interactive whiteboard
- **DEAF AND HEARING-IMPAIRED LEARNERS** rely primarily on visual learning, and the interactive whiteboard facilitates both the presentation of visual material and the use of sign language simultaneously in front of students
- **VISUALLY IMPAIRED STUDENTS** with some vision ability can manipulate objects and use text on an interactive whiteboard's large surface and participate in computer-based learning in ways that would not be possible on a smaller computer screen
- **OTHER SPECIAL NEEDS STUDENTS** with individual learning requirements ranging from physical ability needs to behavioral issues such as Attention Deficit Disorder (ADD) also find the large interactive surface valuable. Its large size and touch sensitivity facilitates ICT learning beyond the standard keyboard and mouse type of computer interaction, and its appeal can be used to promote good behavior.

## Observations from the United States

"The addition of sharp color helps with multisensory learning. One of the grade three students had trouble with short-term memory and the application of color codes to words and phonetics has shown some encouraging results. The student repeats the task by coloring the printout to match the board work.... The special-needs teacher enjoys working with the students and the SMART Board [interactive whiteboard] because of the reduced anxiety, the improvement in the concentration of the students and the flexibility and ease of its tactile use" (Salintri, Smith and Clovis 2002).

"Every student wanted to give a response to write on the board. Students who sat lifeless before were on the ends of their seats, hands ferociously waving in the air, yelling, 'Pick me, Mrs. Jamerson, pick me!' ... Prior to technology integration, it took about four or five warnings [to moderate the behavior of the two ADHD students in the class]. But now, I warned that if [one student] made any more outbursts he would ruin his chance to write on the SMART Board [interactive whiteboard] later. This was enough incentive to keep his impulsive and hyperactive behavior under control. The students with ADHD were very attentive, and less impulsive and hyperactive during technology-integrated instruction" (Jamerson 2002).

"The [interactive white]board engaged students through kinesthetics as they used markers or their hands to respond to the text, highlighting with color or drawing boxes and circles with the tips of their fingers or the palms of their hands. The first graders loved writing with the markers and their fingers on the board. Fingers could be used when someone held the marker, leading the board to recognize and create the line width and color of the missing marker. Writing with fingers allowed the children to feel the shapes of words they outlined, feel and see letter components that created sounds they uttered, and experience a true hands-on approach to creating and erasing text. The board allowed use of multiple senses, leading to increased levels of engagement and greater understanding" (Solvie 2004).

"[The teacher has] been able to play videos on her SMART Board interactive whiteboard and enlarge the text so her [vision-impaired] students can see details they can't usually see on a computer screen. They are finally able to see and interact with a computer image, which is very valuable" (Cooper and Clark 2003).

### Observations from the United Kingdom

"Visual learning through the use of a whiteboard can range from the use of text and pictures to the use of animation or video. Activities that involve auditory learning include the use of words orally for pronunciation, speeches and poems. Allowing students to physically interact with the board can assist with meeting the needs of tactile learners. Numerous software programs can be used that involve user contact with the whiteboard" (Beeland 2002).

"This case study aims to provide evidence that using an interactive whiteboard with primary-aged pupils is an effective tool and, more specifically, that it is of particular benefit to deaf, bilingual children.... At Longwill, we try hard to develop children's self esteem and pride in their abilities. The project did much to promote these aims. The pupils used the interactive whiteboard to make a presentation to friends and staff. ICT holds a high degree of status for children and clearly has a motivating influence on them.... Opportunities to develop interactive activities were endless. Having a projector and whiteboard in class provide[s] many positives, but the interactivity of a SMART Board [interactive whiteboard] enhanced teaching and learning even further" (Carter 2002).

"Being able to present students with visual stimuli by projecting from a laptop onto a whiteboard was seen to be of particular benefit by some special-school teachers. A teacher said, 'With our kids, what you want is visuals. You need something to grab their attention.'" (Cunningham, Kerr, McEune, Smith and Harris 2003).

"[Another teacher observed that] improvement in class focus is due to the very visual nature of teaching with the whiteboard. [It] has really motivated the children, and methods can be modeled much more clearly" (Latham 2002).

"The nature of the interactivity and the images that can be used to reinforce learning is vital in teaching SLDD [specific learning difficulties and/or disabilities] students. To participate in the learning process (and have all the facilities of the word processor to create professional-looking end products) helps students to engage in a way that would not normally be possible in a classroom situation, adding to the richness of the learning experience" (Pugh 2001).

### Observation from Australia

"Of particular importance to the younger children was the tactile nature of the medium, that ready ability to engage

with the material on the board and for the children to use their finger nail to open files, to write or simply to highlight a point" (Lee and Boyle 2003).

## Making the Grade: Review and Retention

There are many variables that factor into student retention of information. The majority of available research on student performance focuses on qualitative observations regarding strategies for information retention; some studies of interactive whiteboard use in education are statistical in nature, but many more provide qualitative impressions.

A student's ability to retain and recall information presented in class is subject to several conditions. Several of these conditions relate to student engagement and motivation during the class itself – the details of which are described above. A student's success is also greatly aided by the availability of accurate notes after class for review.

Learning with interactive whiteboards in the classroom enables effective student retention and review in the following ways:

- Lessons are more memorable because students are more engaged and motivated. Students are able to focus more on the learning moment rather than on worrying about capturing everything through note taking
- Several different learning styles are accommodated when learning is delivered with an interactive whiteboard, improving chances of student retention during class
- Notes generated on an interactive whiteboard can be printed or e-mailed for distribution after class, ensuring the student has good review material to support information retention

### Observations from the United States

"The SMART Board interactive whiteboard used as a tool, in combination with effective teaching strategy, [brings] about dramatic results. The level of enthusiasm in Ms. Moore's math class is far above that of a typical first grade classroom. Not only did the level of interest among students heighten;

Ms. Moore was challenged to think and teach in a new way. This teacher shared the enthusiasm of her students and thought of various ways to promote interaction, stimulate discussion, and make learning easy and enjoyable in the process" (Clemens, Moore and Nelson 2001).

"[T]he groups using the SMART Board interactive whiteboard produced analyses: (1) with greater semantic congruency between the diagrammer's and their other members' diagrams, (2) with a greater comparable number of elements to the analysis and (3) with less structural congruency between the diagrammer's and other members' diagrams.... The quality of the results seem to indicate that the layers provided by the SMART Board interactive whiteboard allowed members of the experimental groups to reach greater semantic similarity" (Vitolo 2003).

"The SMART Board interactive whiteboard produced positive grade changes from six-week to six-week period as well as from unit to unit. Use of the SMART Board interactive whiteboard appears to be a positive tool for assisting functional math achievement with struggling learners" (Zirkle 2003).

"One basic feature of the SMART Board interactive whiteboard is that there are many possibilities for overwriting any projected object. This allows the student to focus. They are not so easily lost and they know what the teacher wants them to select. Because the teacher can emphasize any particular structure by highlighting, underlining, or circling with different colors, it is easier for students to organize new concepts. The SMART Board interactive whiteboard is a valuable learning tool" (Gerard 1999).

"While it is difficult to prove if [interactive whiteboards] boost student grades, they definitely improve students' attitude toward learning and ability to understand complex concepts.... [I appreciate the ability to] record class notes and homework assignments [and] prerecord a daily lesson [for students] when they will be absent from school. Although the teacher isn't seen, students still hear the teacher's voice and see what was written on the whiteboard" (Reardon 2002).

"It proved to be an organizational tool for lesson preparation and an effective way to follow up on instruction.... Everything was saved to the computer, work could be revisited, revised, printed and shared – either electronically or via hard copies – immediately and within the context of the lesson" (Solvie 2004).

## Observations from the United Kingdom

"Evidence gathered through this evaluation demonstrates that interactive whiteboards offer significant potential to raise attainment through developed, well-structured interactive teaching and learning" (Latham 2002).

"Used alongside my established programs of study, I feel I am providing a more informative and interesting curriculum.... Their retention of the skills taught has been excellent" (Greenwell 2002).

"It's easier to understand.... The pace of the lessons is increased, because the teacher does not waste time thinking about the next question, writing it on the board, etc." (Ball 2003).

"Mark felt a major benefit of using the SMART Board [interactive whiteboard] and SMART Notebook™ [software] here was that, had a child arrived late to the lesson after the initial introduction, he'd still have a copy of what that child had missed" (Towlson 2003).

## Observation from Australia

"The large visual-stimulus facility was seen as particularly important, as was the ready ability to 'replay' work. The boards and a scanner allow the teacher to transform an A4 page into a very large image, to then manipulate that image and, if desired, to 'play back' work done. For example, with children's handwriting, the system can replay, in slow motion, the child's writing of a letter. This kind of facility not only engages the children, but also holds their attention" (Lee and Boyle 2003).

# Get Ready: Teacher Preparation

Efficient use of technology by educators is essential to successfully enhancing student learning. Once educators have received professional development and an educational technology installation is up and running, ICT integration should mesh seamlessly with the rest of the curriculum and help streamline lesson preparation.

Interactive whiteboards enhance teacher preparation:

- They are easy to use for both teachers and students, shortening start-up time for integrating interactive whiteboards into lessons (with additional features and tools to learn and use as skill levels grow)

- They motivate teachers to adapt lessons to incorporate and develop more digital resources. Teachers respond enthusiastically when they observe positive attitudes and behaviors from students using interactive whiteboards.
- Teachers can save notes for use next class or next year. Interactive whiteboards make it easier to build a collection of learning materials that can be constantly updated and written on top of, keeping lessons fresh and interactive.

### Observations from the United States

"Our pilot results showed that more female than male FSG [Faculty, Staff, Graduate students] attended SMART Board interactive whiteboard training sessions.... Female faculty seemed as eager and as capable as male faculty in SMART Board interactive whiteboard training and classroom use.... Based on the SMART Board interactive whiteboard's user-friendly features and advantages as perceived by most of the participants, this emerging technology can have a widening impact upon educational instruction" (McNeese 2003).

"It proved to be an organizational tool for lesson preparation and an effective way to follow up on instruction" (Solvie 2004).

"It promotes the organizational skills of the teacher" (Gerard 1999).

### Observations from the United Kingdom

"A number of teachers indicated that the interactive nature of the board was freeing them from the time-consuming task of making resources, such as number cards, again reducing their preparation time and reducing duplication.... There was clear evidence of teachers saving entire whiteboard lessons for future use. Nearly all teachers reported that in the long run, the ability to save and edit lessons would reduce preparation time and save unnecessary duplication" (Bush, Priest, Coe et al. 2004).

"Eighty-four per cent of the teachers felt that their planning and preparation was now more effective than before" (Latham 2002).

"The teacher also had positive attitudes to the big screen because it enabled her to do her job more effectively" (Cooper 2003).

"Teachers using an electronic whiteboard instead of a blackboard...had the additional advantage that they could save their notes for use later." (Cox, Webb, Abbott, Blakeley, Beauchamp and Rhodes 2003).

"It encourages teacher to plan lessons which involve interactive whole-class activities" (Ball 2003).

"The teacher also used SMART Notebook [software] to prepare written problems ahead of time for the children, enabling them to quickly and efficiently explore different solutions to given problems. They could also annotate and save these annotations quite simply as they occurred" (Worth Primary School 2003).

### Observations from Australia

"The interactive whiteboards have allowed teachers to take advantage of the power of ICT within the teaching component of the teaching and learning process in ways that are just not possible with the traditional personal computing approach to ICT in schools" (Kent 2003).

"All the teachers using the boards commented on their need to shorten their program timelines. The children would appear to be completing work faster and in greater depth [using interactive whiteboards]" (Lee and Boyle 2003).

## Conclusion

The interactive whiteboard has been incorporated into learning environments for over a decade, and an increasing flow of research into its impact is emerging from the United States, the United Kingdom and Australia. From the available body of research, several themes and patterns are evident, including the positive effect interactive whiteboards have on student engagement, motivation, the ability to encompass a variety of learning styles (including special-needs students) and the ability to enhance student retention and review processes. Observations also indicate that designing lessons around interactive whiteboards can help educators streamline their preparations and be more efficient in their ICT integration.

# Bibliography and Further Reading

Research reports, magazine articles and case studies highlighting engagement, motivation, learning styles, retention and review, and teacher preparation findings with regard to interactive whiteboard use appear alphabetically, by category, below.

## ENGAGEMENT

- Ball, Barbara. "Teaching and learning mathematics with an interactive whiteboard." *Micromath* (Spring 2003): 4-7.
- Beeland, William D., Jr. "Student Engagement, Visual Learning and Technology: Can Interactive Whiteboards Help?" [http://chiron.valdosta.edu/are/Artmanscript/vol1no1/beeland\\_am.pdf](http://chiron.valdosta.edu/are/Artmanscript/vol1no1/beeland_am.pdf). 2002. (Accessed March 23, 2004)
- Cox, Margaret, M. Webb, C. Abbott, B. Blakeley, T. Beauchamp and V. Rhodes. "ICT and Pedagogy: A Review of the Research Literature." [http://www.becta.org.uk/page\\_documents/research/ict\\_pedagogy\\_summary.pdf](http://www.becta.org.uk/page_documents/research/ict_pedagogy_summary.pdf). Department for Education and Skills and Becta. 2003. (Accessed March 23, 2004)
- Cunningham, Mark, K. Kerr, R. McEune, P. Smith and S. Harris. "Laptops for Teachers: An Evaluation of the First Year of the Initiative." [http://www.becta.org.uk/page\\_documents/research/ift\\_evaluation.pdf](http://www.becta.org.uk/page_documents/research/ift_evaluation.pdf). National Foundation for Educational Research and Becta. 2003. (Accessed March 23, 2004)
- Edwards, Julie-Ann, M. Hartnell and R. Martin. "Interactive Whiteboards: Some Lessons for the Classroom." *Micromath* (Summer 2002): 30-33.
- Gerard, Fabienne and Jamey Widener. "A SMARTer Way to Teach Foreign Language: The SMART Board Interactive Whiteboard as a Language Learning Tool." <http://edcompass.smarttech.com/en/learning/research/SBforeignlanguageclass.pdf>. Cary Academy, North Carolina. First presented at SITE 99 Conference. 1999. (Accessed March 23, 2004)
- Kent, Peter. "e-Teaching – The Elusive Promise." <http://edcompass.smarttech.com/en/learning/research/pdf/kent1.pdf>. Richardson Primary School. 2003. (Accessed March 23, 2004)
- Latham, Penny. "Teaching and Learning Primary Mathematics: The Impact of Interactive Whiteboards." <http://www.beam.co.uk/pdfs/RES03.pdf>. North Islington Education Action Zone. 2002. (Accessed March 23, 2004)
- Lee, Mal, and Maureen Boyle. "The Educational Effects and Implications of the Interactive Whiteboard Strategy of Richardson Primary School: A Brief Review." [www.richardsonps.act.edu.au/RichardsonReview\\_Grey.pdf](http://www.richardsonps.act.edu.au/RichardsonReview_Grey.pdf). Richardson Primary School. 2003 (Accessed March 23, 2004)
- Reed, Sandra. "Integrating an Interactive Whiteboard into the Language Classroom." <http://ferl.becta.org.uk/display.cfm?resid=1569&printable=1>. Becta. 2001. (Accessed March 23, 2004)

Solvie, Pamela A. "The Digital Whiteboard: A Tool in Early Literacy Instruction." *Reading Teacher* 57.5 (February 2004): 484-7.

Solvie, Pamela A. "The Digital Whiteboards as a Tool in Increasing Student Attention During Early Literacy Instruction." [www.smarterkids.org/research/paper13.asp](http://www.smarterkids.org/research/paper13.asp) Morris Area Elementary School. 2001. (Accessed March 23, 2004)

## MOTIVATION

- Bell, Mary Ann. "Teachers' Perceptions Regarding the Use of the Interactive Electronic Whiteboard in Instruction." [www.smarterkids.org/research/paper6.asp](http://www.smarterkids.org/research/paper6.asp) Baylor University. 1998. (Accessed March 23, 2004)
- Blanton, Bonnie Little and Rebecca Helms-Breazeale. "Gains in Self-Efficacy: Using SMART Board Interactive Whiteboard Technology in Special Education Classrooms." [www.smarterkids.org/research/paper2.asp](http://www.smarterkids.org/research/paper2.asp). Augusta State University. 2000. (Accessed March 23, 2004)
- Bush, Nigel, J. Priest, R. Coe, et al. "An Exploration of the Use of ICT at the Millennium Primary School, Greenwich." [http://www.becta.co.uk/page\\_documents/research/greenwich\\_mps\\_report.pdf](http://www.becta.co.uk/page_documents/research/greenwich_mps_report.pdf). Becta. 2004. (Accessed March 23, 2004)
- Cooper, Bridget. "The Significance of Affective Issues in Successful Learning with ICT for Year One and Two Pupils and their Teachers: The Final Outcomes of the ICT and the Whole Child Project." NIMIS and Whole Child Project, Leeds University. 2003. (Publication forthcoming)
- Cox, Margaret, M. Webb, C. Abbott, B. Blakeley, T. Beauchamp, and V. Rhodes. "ICT and Pedagogy: A review of the Research Literature." [http://www.becta.org.uk/page\\_documents/research/ict\\_pedagogy\\_summary.pdf](http://www.becta.org.uk/page_documents/research/ict_pedagogy_summary.pdf). Department for Education and Skills and Becta. 2003. (Accessed March 23, 2004)
- Cunningham, Mark, K. Kerr, R. McEune, P. Smith, and S. Harris. "Laptops for Teachers: An Evaluation of the First Year of the Initiative." [http://www.becta.org.uk/page\\_documents/research/ift\\_evaluation.pdf](http://www.becta.org.uk/page_documents/research/ift_evaluation.pdf). National Foundation for Educational Research and Becta. 2003. (Accessed March 23, 2004)
- Gerard, Fabienne and Jamey Widener. "A SMARTer Way to Teach Foreign Language: The SMART Board Interactive Whiteboard as a Language Learning Tool." <http://edcompass.smarttech.com/en/learning/research/SBforeignlanguageclass.pdf>. Cary Academy, North Carolina. First presented at SITE 99 Conference. 1999. (Accessed March 23, 2004)
- Greenwell, Lis. "Physical Education: An Interactive Approach." <http://www.sportsteacher.co.uk/features/editorial/pe.html>. 2002. (Accessed 3 March 2004)
- Johnson, Natalie. "Large Screen Computers vs. Electronic Whiteboards When Teaching Online Card Catalog Skills: Is One Technology Better Than the Other?" Wichita State University. 2004.
- Latham, Penny. "Teaching and Learning Primary Mathematics: The Impact of Interactive Whiteboards." <http://www.beam.co.uk/pdfs/RES03.pdf>. North Islington Education Action Zone. 2002. (Accessed March 23, 2004)
- Lee, Mal, and Boyle, Maureen. "The Educational Effects and Implications of the Interactive Whiteboard Strategy of Richardson Primary School: A Brief



- Review." [www.richardsonps.act.edu.au/RichardsonReview\\_Grey.pdf](http://www.richardsonps.act.edu.au/RichardsonReview_Grey.pdf). Richardson Primary School. 2003. (Accessed March 23, 2004)
- Reardon, Tom. "Interactive Whiteboards in School: Effective Uses." *Media and Methods* 38.7 (August 2002): 12.
- Richardson, Anne. "Effective Questioning in Teaching Mathematics Using an Interactive Whiteboard." *Micromath* (Summer 2002): 8-12.
- Salintri, Geri, K. Smith and C. Clovis. "The Aural Enabler: Creating a Way for Special Needs Kids to Participate in the Classroom Lesson." [www.smarterkids.org/research/paper12.asp](http://www.smarterkids.org/research/paper12.asp). University of Windsor. 2002. (Accessed 3 March 2004)
- Smith, Anna. "Interactive Whiteboard Evaluation." <http://www.mirandanet.ac.uk/pubs/SMARTBoard.htm>. MirandaNet. 2000. (Accessed March 23, 2004)
- Solvie, Pamela A. "The Digital Whiteboards as a Tool in Increasing Student Attention During Early Literacy Instruction." [www.smarterkids.org/research/paper13.asp](http://www.smarterkids.org/research/paper13.asp). Morris Area Elementary School. 2001. (Accessed 3 March 2004)
- Tate, Linda. "Using the Interactive Whiteboard to Increase Student Retention, Attention, Participation, Interest and Success in a Required General Education College Course." [www.smarterkids.org/research/pdf/tate.pdf](http://www.smarterkids.org/research/pdf/tate.pdf). Shepherd College. 2002. (Accessed March 23, 2004)
- LEARNING STYLES AND SPECIAL NEEDS**
- Beeland, William D., Jr. "Student Engagement, Visual Learning and Technology: Can Interactive Whiteboards Help?" [http://chiron.valdosta.edu/are/Artmanscript/vol1no1/beeland\\_am.pdf](http://chiron.valdosta.edu/are/Artmanscript/vol1no1/beeland_am.pdf). 2002. (Accessed March 23, 2004)
- Carter, Alison. "Using Interactive Whiteboards with Deaf Children." <http://www.bgfl.org/bgfl/activities/intranet/teacher/ict/whiteboards/>. Becta. 2002. (Accessed March 23, 2004)
- Cooper, Susan and Sue Clark. "Showing, Telling, Sharing: Florida School for the Deaf and Blind." <http://edcompass.smarttech.com/en/casestudies/fsdb.aspx>. EDCompass online community for educators using SMART products. 2003. (Accessed March 23, 2004)
- Cunningham, Mark, K. Kerr, R. McEune, P. Smith, and S. Harris. "Laptops for Teachers: An Evaluation of the First Year of the Initiative." [http://www.becta.org.uk/page\\_documents/research/lft\\_evaluation.pdf](http://www.becta.org.uk/page_documents/research/lft_evaluation.pdf). National Foundation for Educational Research and Becta. 2003. (Accessed March 23, 2004)
- Jamerson, Joyce. "Helping All Children Learn: Action Research Project." <http://www.smarterkids.org/research/paper15.asp>. 2002. (Accessed March 23, 2004)
- Latham, Penny. "Teaching and Learning Primary Mathematics: The Impact of Interactive Whiteboards." <http://www.beam.co.uk/pdfs/RES03.pdf>. North Islington Education Action Zone. 2002. (Accessed March 23, 2004)
- Lee, Mal, and Maureen Boyle. "The Educational Effects and Implications of the Interactive Whiteboard Strategy of Richardson Primary School: A Brief Review." [www.richardsonps.act.edu.au/RichardsonReview\\_Grey.pdf](http://www.richardsonps.act.edu.au/RichardsonReview_Grey.pdf). Richardson Primary School. 2003. (Accessed March 23, 2004)
- Pugh, Matthew D. "Using an Interactive Whiteboard with SLD Students." <http://ferl.becta.org.uk/display.cfm?resid=1393&printable=1>. Becta. 2001. (Accessed March 23, 2004)
- Salintri, Geri, K. Smith, and C. Clovis. "The Aural Enabler: Creating a Way for Special Needs Kids to Participate in the Classroom Lesson." [www.smarterkids.org/research/paper12.asp](http://www.smarterkids.org/research/paper12.asp). University of Windsor. 2002. (Accessed March 23, 2004)
- Solvie, Pamela A. "The Digital Whiteboard: A Tool in Early Literacy Instruction." *Reading Teacher* 57.5 (February 2004): 484-7.
- RETENTION AND REVIEW**
- Ball, Barbara. "Teaching and Learning Mathematics with an Interactive Whiteboard." *Micromath* (Spring 2003) 4-7. 2003.
- Clemens, Anne, T. Moore, and B. Nelson. "Math Intervention 'SMART' Project (Student Mathematical Analysis and Reasoning with Technology)." [www.smarterkids.org/research/paper10.asp](http://www.smarterkids.org/research/paper10.asp). Mueller Elementary School. 2001. (Accessed March 23, 2004)
- Gerard, Fabienne and Jamey Widener. "A SMARTer Way to Teach Foreign Language: The SMART Board Interactive Whiteboard as a Language Learning Tool." <http://edcompass.smarttech.com/en/learning/research/SBforeignlanguageclass.pdf>. Cary Academy, North Carolina. First presented at SITE 99 Conference. 1999. (Accessed March 23, 2004)
- Greenwell, Lis. "Physical Education: An Interactive Approach." <http://www.sportsteacher.co.uk/features/editorial/pe.html>. 2002. (Accessed 3 March 2004).
- Latham, Penny. "Teaching and Learning Primary Mathematics: The Impact of Interactive Whiteboards." <http://www.beam.co.uk/pdfs/RES03.pdf>. North Islington Education Action Zone. 2002. (Accessed March 23, 2004)
- Lee, Mal, and Maureen Boyle. "The Educational Effects and Implications of the Interactive Whiteboard Strategy of Richardson Primary School: A Brief Review." [www.richardsonps.act.edu.au/RichardsonReview\\_Grey.pdf](http://www.richardsonps.act.edu.au/RichardsonReview_Grey.pdf). Richardson Primary School. 2003. (Accessed March 23, 2004)
- Reardon, Tom. "Interactive Whiteboards in School: Effective Uses." *Media and Methods* 38.7. (August 2002): 12.
- Solvie, Pamela A. "The Digital Whiteboard: A Tool in Early Literacy Instruction." *Reading Teacher* 57.5 (February 2004): 484-7.
- Towilson, Mark. "Using a SMART Board with Year 7 Maths." Client website. <http://client.canterbury.ac.uk/research/smart/sandwich-tech/sandwich-tech.asp>. 2003. (Accessed March 23, 2004)
- Vitolo, Theresa M., Ph.D. "The Importance of the Path Not Taken: The Value of Sharing Process as Well as Product." <http://www.smarterkids.org/research/pdf/Vitolo.pdf>. Gannon University. 2003. (Accessed March 23, 2004)
- Zirkle, Meredith L. "The Effects of SMART Board™ Interactive Whiteboard on High School Students with Special Needs in a Functional Mathematics Class." <http://edcompass.smarttech.com/en/learning/research/pdf/mennoniteUniversityResearch.pdf>. Eastern Mennonite University. 2003. (Accessed March 23, 2004) Teacher Preparation

- Ball, Barbara. "Teaching and Learning Mathematics with an Interactive Whiteboard." *Micromath* (Spring 2003) 4-7.
- Bush, Nigel, J. Priest, R. Coe, et al. "An Exploration of the Use of ICT at the Millennium Primary School, Greenwich." [http://www.becta.co.uk/page\\_documents/research/greenwich\\_mps\\_report.pdf](http://www.becta.co.uk/page_documents/research/greenwich_mps_report.pdf). Becta. 2004. (Accessed March 23, 2004)
- Cooper, Susan and Sue Clark. "Showing, Telling, Sharing: Florida School for the Deaf and Blind." <http://edcompass.smarttech.com/en/casestudies/fsdb.aspx>. EDCompass online community for educators using SMART products. 2003. (Accessed March 23, 2004)
- Cox, Margaret, M. Webb, C. Abbott, B. Blakeley, T. Beauchamp and V. Rhodes. "ICT and Pedagogy: A Review of the Research Literature." [http://www.becta.org.uk/page\\_documents/research/ict\\_pedagogy\\_summary.pdf](http://www.becta.org.uk/page_documents/research/ict_pedagogy_summary.pdf). Department for Education and Skills and Becta. 2003. (Accessed March 23, 2004)
- Gerard, Fabienne and Jamey Widener. "A SMARTer Way to Teach Foreign Language: The SMART Board Interactive Whiteboard as a Language Learning Tool." <http://edcompass.smarttech.com/en/learning/research/SBforeignlanguageclass.pdf>. Cary Academy, North Carolina. First presented at SITE 99 Conference. 1999. (Accessed March 23, 2004)
- Kent, Peter. "'E-teaching' with Interactive Whiteboards." *Practicing Administrator*. Also <http://edcompass.smarttech.com/en/learning/research/pdf/kent1.pdf>. 2004. (Accessed March 23, 2004)
- Latham, Penny. "Teaching and Learning Primary Mathematics: The Impact of Interactive Whiteboards." <http://www.beam.co.uk/pdfs/RES03.pdf>. North Islington Education Action Zone. 2002. (Accessed March 23, 2004)
- Lee, Mal, and Maureen Boyle. "The Educational Effects and Implications of the Interactive Whiteboard Strategy of Richardson Primary School: A Brief Review." [www.richardsonps.act.edu.au/RichardsonReview\\_Grey.pdf](http://www.richardsonps.act.edu.au/RichardsonReview_Grey.pdf). Richardson Primary School. 2003. (Accessed March 23, 2004)
- McNeese, Mary Nell, Ph.D. "Acquisition and Integration of SMART Board Interactive Whiteboard Skills: Gender Differences Among College Faculty, Staff and Graduate Assistants." <http://www.smarterkids.org/research/pdf/McNeese.pdf>. University of Southern Mississippi. 2003. (Accessed March 23, 2004)
- Solvie, Pamela A. "The Digital Whiteboard: A Tool in Early Literacy Instruction." *Reading Teacher* 57.5 (February 2004): 484-7.
- Worth Primary School. "Using the Interactive Whiteboard in Numeracy." <http://client.canterbury.ac.uk/research/smart/kit-tif/worth/worth.asp>. Client website. 2003. (Accessed March 23, 2004)

# The Florida School for the Deaf and the Blind

## Case Study, St. Augustine, Florida, United States



*"We had looked at other interactive whiteboards on the market and found that the SMART Board interactive whiteboard fit our needs the best."*

*— Sue Clark, Math Teacher*

## One of America's Largest Special Needs Schools Standardizes on SMART Products

The Florida School for the Deaf and the Blind (FSDB) is one of the largest schools of its type in the United States, accommodating the diverse needs of more than 750 students from pre-kindergarten to grade 12. When FSDB decided to add interactive whiteboards to its classrooms to improve learning outcomes, it needed to find a product that would benefit all students.

After evaluating and comparing the ease of use and features of various interactive whiteboard brands, FSDB chose the SMART Board™ interactive whiteboard for campus-wide installation.

"We had looked at other interactive whiteboards on the market and found that the SMART Board interactive whiteboard fit our needs the best," says Sue Clark, a mathematics teacher at FSDB. "When teaching deaf students, we need our hands free to use sign language. Having the option to use your finger instead of a pen with the SMART Board interactive whiteboard allows us to do that."

Now that FSDB has standardized on the product, SMART Board interactive whiteboards are being used with Mac OS X applications in

almost all subject areas throughout the school. Students create movies and storyboards using iPhoto™, iMovie® and Quicktime® applications on the SMART Board interactive whiteboard, applying effects and transitions to photos and videos captured during field trips. Teachers are finding that the features of the interactive whiteboards can be applied to improving learning outcomes for students with hearing or vision impairments, as well as those with secondary handicaps.

Students like those in Paula Brannon's class, who are not completely blind but have some degree of vision impairment, have found that the size of the screen helps them see things in the classroom they've never seen before.

"Paula was able to play videos on her SMART Board interactive whiteboard and enlarge the image, so her students could see details they couldn't usually see on a computer screen," explains Clark. "They were finally able to see and interact with a computer image, which is very valuable."

Another area where teachers are noticing that value of the interactive whiteboards is in teaching grammar basics. Susan Cooper, a reading and language teacher at FSDB, says

### Challenge

Standardization on an interactive whiteboard that benefits students with special needs.

### SMART Solution

SMART Board interactive whiteboard.

### Result

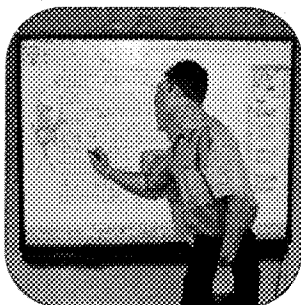
Learning experiences improved.

*"It benefits the whole educational process. I love this tool. I couldn't teach without it."*

# The Florida School for the Deaf and the Blind

Case Study, St. Augustine, Florida, United States

*"Using the SMART Board interactive whiteboard is a very inclusive experience for our students. The interactivity keeps students focused on learning and motivates them."*



Teachers at FSDB use the SMART Board interactive whiteboard to engage students in learning.

many students arrive with limited language abilities, but the interactive whiteboards help improve language skills.

"Using the SMART Board interactive whiteboard is a very inclusive experience for our students. The interactivity keeps students focused on learning and motivates them," explains Cooper. "Our deaf students need a way to see English visually. Teachers across campus are using the SMART Board interactive whiteboard and Notebook™ software to color-code words and sentences. This helps students learn proper sentence structure and see how words function in sentences. Students can easily change colors of words as they change functions in a sentence. It gets students involved and benefits the whole educational process. I couldn't teach this without the SMART Board interactive whiteboard!"

Clark says she has also witnessed the positive impact that SMART Board interactive whiteboards have on her students.

"I had a student named Allen who preferred just to sit back and not interact. Having the SMART Board interactive whiteboard really encouraged him to come up and present – even if he was just solving a fraction problem for his peers. It helped him come out of his

shell," explains Clark. "Another teacher told me that the SMART Board interactive whiteboard is a lifesaver because kids are so fascinated by it, they want to learn more."

With results like these SMART Board interactive whiteboards will continue to captivate teachers and students at FSDB for years to come, helping them set and achieve continuously higher learning goals.

*"Another teacher told me that the SMART Board interactive whiteboard is a lifesaver because kids are so fascinated by it, they want to learn more."*

## About SMART

SMART is both the industry pioneer and global market leader in easy-to-use interactive whiteboards and other group collaboration tools. SMART products include the family of award-winning SMART Board interactive whiteboards, interactive pen displays, interactive digital signage, multimedia cabinets and software. Using SMART products, groups can access and share the information they need to meet, teach, train and present. SMART customers include NASA, British Telecom, BMW, the Los Angeles Lakers, the U.S. Joint Chiefs of Staff, Disney Imagineering and Harvard University. SMART products are sold through dealers across North America and distributors worldwide.

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